AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method for forming a passivated metal layer, the method comprising:

providing a substrate in a process chamber of a processing system;

exposing the substrate to a process gas containing a rhenium-carbonyl precursor to deposit a rhenium metal layer on the substrate in a thermal chemical vapor deposition process; and

forming a ~~passivation layer~~ silicon-containing passivation layer or a carbon-containing passivation layer on the rhenium metal layer, wherein the passivation layer is effective to inhibit oxygen-induced growth of Re-containing nodules on a surface of the rhenium metal layer.

2-7. (Canceled)

8. (Currently Amended) ~~The method according to claim 1, wherein forming the passivation layer comprises~~ A method for forming a passivated metal layer, the method comprising:

providing a substrate in a process chamber of a processing system;

exposing the substrate to a process gas containing a rhenium-carbonyl precursor to deposit a rhenium metal layer on the substrate in a thermal chemical vapor deposition process; and

exposing the rhenium metal layer to a gas containing silicon, carbon, nitrogen, oxygen, or boron, or a combination of two or more thereof, and annealing the substrate to diffuse the respective silicon, carbon, nitrogen, oxygen or boron into at least a surface portion of the rhenium metal layer to form a passivation layer effective to inhibit oxygen-induced growth of Re-containing nodules on a surface of the rhenium metal layer.

9. (Original) The method according to claim 8, wherein the gas comprises SiH_4, Si_2H_6, $SiCl_2H_2$, Si_2Cl_6, CH_4, C_2H_6, C_2H_4, C_2H_2, C_3H_6, C_2H_5OH, $CH_3CH_2CH_2OH$, CH_3COCH_3, C_4H_8O, N_2, NH_3, NO, NO_2, N_2O, O_2, BH_4 or B_2H_6, or a combination of two or more thereof.

10. (Currently Amended) ~~The method according to claim 1,~~ A method for forming a passivated metal layer, the method comprising:

providing a substrate in a process chamber of a processing system;

exposing the substrate to a process gas containing a rhenium-carbonyl precursor to deposit a rhenium metal layer on the substrate in a thermal chemical vapor deposition process; and

~~wherein~~ forming ~~the~~ a passivation layer on the rhenium metal layer by ~~comprises~~ exposing the substrate to a metal-carbonyl precursor gas and a silicon-containing gas, a carbon-containing gas, ~~a nitrogen-containing gas,~~ an oxygen-containing gas, or a boron-containing gas, or a combination of two or more thereof, ~~to form~~ whereby the passivation layer is at least one of a metal silicide layer, a metal carbide layer, ~~a metal nitride layer,~~ a metal oxide layer, or a metal boride layer, or a combination thereof, and wherein the passivation layer is effective to inhibit oxygen-induced growth of Re-containing nodules on a surface of the rhenium metal layer.

11. (Currently Amended) The method according to claim 10, wherein the metal-carbonyl precursor comprises $W(CO)_6$, $Ru_3(CO)_{12}$, $Ni(CO)_4$, $Mo(CO)_6$, $Co_2(CO)_8$, $Rh_4(CO)_{12}$, $Re_2(CO)_{10}$, $Os_3(CO)_{12}$, or $Cr(CO)_6$, or a combination of two or more thereof, the silicon-containing gas comprises SiH_4, Si_2H_6, $SiCl_2H_2$, Si_2Cl_6, or a combination of two or more thereof, the carbon-containing gas comprises CH_4, C_2H_6, C_2H_4, C_2H_2, C_3H_6, C_2H_5OH, $CH_3CH_2CH_2OH$, CH_3COCH_3, or C_4H_8O, or a combination of two or more thereof, ~~the nitrogen-containing gas comprises N_2, NH_3, NO, NO_2, or~~

~~N_2O, or a combination of two or more thereof,~~ the oxygen-containing gas comprises O_2, and the boron-containing gas comprises BH_4 or B_2H_6, or both.

12. (Currently Amended) The method according to claim 1, ~~wherein the passivation layer comprises a~~ further comprising annealing the silicon-containing passivation layer or ~~a~~ the carbon-containing passivation layer ~~formed on~~ to diffuse the silicon or carbon into at least a surface portion of the rhenium metal layer to form a rhenium silicide or rhenium carbide passivation layer.

13. (Currently Amended) The method according to claim 1, wherein the rhenium metal layer and the passivation layer are formed in the same processing system.

14. (Currently Amended) The method according to claim 1, wherein the rhenium metal layer and the passivation layer are formed in different processing systems.

15. (Currently Amended) A method for forming a passivated Re layer, the method comprising:

providing a substrate in a process chamber of a processing system;

exposing the substrate to a process gas containing a ~~$Re_2(CO)_{10}$~~ rhenium carbonyl precursor to deposit a Re layer on the substrate in a chemical vapor deposition process; ~~and~~

forming a tungsten passivation layer on the Re layer; and

forming a silicon passivation layer on the tungsten passivation layer, wherein the tungsten and silicon passivation layers are ~~is~~ effective to inhibit oxygen-induced growth of Re-containing nodules on a surface of the Re layer.

16. (Currently Amended) The method according to claim 15, wherein the tungsten passivation layer ~~comprises a W layer~~ is formed in a chemical vapor deposition process by exposing the Re layer to $W(CO)_6$.

17. (Currently Amended) The method according to claim 15, wherein the silicon passivation layer ~~comprises a silicon-containing layer~~ is formed in a chemical vapor deposition process by exposing the ~~Re~~tungsten passivation layer to SiH_4, Si_2H_6, $SiCl_2H_2$, or Si_2Cl_6, or a combination of two or more thereof.

18. (Currently Amended) The method according to claim 15, wherein the Re layer and the tungsten and silicon passivation layers are formed in the same processing system.

19. (Currently Amended) The method according to claim 15, wherein the Re layer and the tungsten and silicon passivation layers are formed in different processing systems.

20. Cancelled.

21. (New) The method according to claim 15, wherein the rhenium carbonyl precursor comprises $Re_2(CO)_{10}$.

22. (New) The method according to claim 15, further comprising annealing the substrate to convert at least a portion of the tungsten and silicon passivation layers to a tungsten silicide passivation layer.

23. (New) A method for forming a passivated metal layer, the method comprising:

providing a substrate in a process chamber of a processing system;

exposing the substrate to a process gas containing a rhenium-carbonyl precursor to deposit a rhenium metal layer on the substrate in a thermal chemical vapor deposition process; and

forming a passivation layer on the rhenium metal layer by:

first, forming a metal layer on the rhenium metal layer,

second, exposing the metal layer to a silicon-containing gas, a carbon-containing gas, a nitrogen-containing gas, an oxygen-containing gas, or a boron-containing gas, or a combination of two or more thereof, and

third, diffusing the silicon, carbon, nitrogen, oxygen and/or boron into the metal layer to convert the metal layer to a metal silicide, a metal carbide, a metal nitride, a metal oxide and/or a metal boride,

wherein the passivation layer is effective to inhibit oxygen-induced growth of Re-containing nodules on a surface of the rhenium metal layer.